



# UNITED STATES PATENT AND TRADEMARK OFFICE

*cen*  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/570,663	03/06/2006	Akihiko Endo	P29122	1239
7055 7590 10/03/2007 GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191			EXAMINER LEE, HSIEN MING	
			ART UNIT 2823	PAPER NUMBER
			NOTIFICATION DATE 10/03/2007	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com  
pto@gbpatent.com

**Office Action Summary**

Application No.

10/570,663

Applicant(s)

ENDO ET AL.

Examiner

Hsien-ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on 27 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 6 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE  
PRIMARY EXAMINER

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 20060614.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

9/27/07

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of claims 1-5 and 7-17 in the reply filed on 7/27/2007 is acknowledged. The traversal is on the ground(s) that the present application is a National Stage application submitted under 35 U.S.C. § 371, and thus, PCT Unity of Invention practice governs the issuance of any Restriction Requirement, not Restriction Requirement based on 35 U.S.C. § 121; and thus concluded that the Restriction Requirement is improper.

This is not found persuasive because 10/570,663 is a US application, not a PCT application and thus 35 U.S.C. § 121 governs the restriction requirement rule. Even applying PCT Unity of Invention practice, the current application still lacks unity because Invention II (claims 6 and 18) claims ion-implanting onto a wafer for active layer to form an ion-implanted area therein, the active layer wafer comprising an insulating film formed thereon and containing boron at a concentration of  $9 \times 10^{18}$  atoms/cm<sup>3</sup> or higher and oxygen at a concentration below  $12 \times 10^{-7}$  atoms/cm<sup>3</sup>, which are not recited in Invention I (claims 1-5 and 7-17).

The requirement is still deemed proper and is therefore made FINAL.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2823

3. Claims 1-5 and 7-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwahara et al. (US 2001/0029072) in view of Srikrishnan (US 5,882,987).

In re claim 1, Kuwahara et al. teach a method for producing a bonded wafer, comprising:

- an epitaxial growth step for growing an epitaxial layer 13 in a wafer 2 for active layer (Fig.1(a));
- an insulating film formation step for forming an insulating film 3 in a surface of said epitaxial layer 13 (Fig.1(b));
- an ion implantation step, following said insulating film formation, for ion-implanting of a light element (i.e.  $H^+$ ) into said epitaxial layer 13 at a predetermined depth to thereby form an ion-implanted area 4 therein (Fig.1(c));
- a bonding step, following said ion implantation, for bonding said active layer wafer 2 and a supporting wafer 1 together with said insulating film 3 interposed therebetween to thereby form a bonded wafer (Fig.1(d)); and
- a cleavage and separation step for heat treating said bonded wafer to cause bubbles of light element to be generated in said ion-implanted area 4 (paragraph [0058]) and thereby a part of said active wafer 2 to be cleaved and separated at the site of said predetermined depth for forming an active layer 7 (Fig.1(e)).

Kuwahara et al. do not teach that the epitaxial layer contains boron.

Srikrishnan, however, in an analogous art, teach doping boron into the epitaxial layer 505 (col. 4, lines 38-41) prior to forming the insulating film.

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to dope boron, as taught by Srikrishnan, in the epitaxial layer of Kuwahara et al, prior to form the insulating film in the epitaxial layer, since by this manner it would be beneficial to the subsequent processing step, such as forming the active layer.

In re claim 2, the selection of the concentration of boron in the epitaxial layer is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III

In re claim 3, Kuwahara et al. teach that the thickness of the epitaxial layer 13 is about 10  $\mu\text{m}$ , which overlaps the claimed range of 0.3  $\mu\text{m}$  or thicker.

In re claims 4, 9 and 10, Kuwahara et al. teach that the ion-implanted area 4 is formed in the epitaxial layer 13 (Fig.1(c)).

In re claims 5 and 11-13, Kuwahara et al. teach that the thickness of the insulating film 3 is of about 0.1  $\mu\text{m}$  (paragraph [0055]), which is thinner than 0.2  $\mu\text{m}$ .

In re claims 7 and 14-17, Kuwahara et al. teach that an annealing process is applied to the said bonded wafer at 1000 °C or 1200 ~1350 °C for 6 hours or less in a reducing atmosphere containing hydrogen (paragraph [0078]) after formation of said insulating film in said active layer.

Art Unit: 2823

In re claim 8, Kuwahara et al. teach that the thickness of the epitaxial layer 13 is of about 10  $\mu\text{m}$  (paragraph [0054]), which overlaps the claimed range of 0.3  $\mu\text{m}$  or thicker.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (7:30 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hsien-ming Lee  
Primary Examiner  
Art Unit 2823

Sep. 26, 2007

HSIEN-MING LEE  
PRIMARY EXAMINER

9/27/07